

CLAIMS

What is claimed is:

1. A valve stem seal assembly for use in a valve-containing device having a valve with a valve stem thereon, said valve stem assembly including:

a generally hollow first cylindrical shell having a radially inwardly extending flange adjacent an axially outer end of said shell and a radially outwardly extending flange adjacent an axially inward end of said shell;

a generally hollow second cylindrical shell having a radially outwardly extending seat adjacent an axially outer end thereof and a radially inwardly extending flange adjacent an axially inward end thereof, a portion of said first shell extending axially within an inner surface of said second shell, said second shell further including a generally axially-extending engagement portion adjacent said second shell axially inward end, said axially-extending engagement portion engaging a portion of an outer surface of said first shell in an interference fit therebetween; and

a resilient sealing body supported by said first shell, said resilient sealing body having an opening therethrough for receiving the valve stem in sealing contact therewith when said valve stem seal assembly is assembled into the valve-containing device.

2. A valve stem seal assembly according to claim 1, wherein said first rigid cylindrical shell is made of a metal-containing material.

3. A valve stem seal assembly according to claim 1, wherein said second rigid cylindrical shell is made of a metal-containing material.

4. A valve stem seal assembly according to claim 1, wherein said resilient sealing body is made of an elastomeric material.

5. A valve stem seal assembly according to claim 1, further including an annular sealing lip on a radially inner portion of said resilient sealing body.

6. A valve stem seal assembly according to claim 1, wherein said resilient seal body is fixedly interconnected with said first rigid cylindrical shell.

7. A valve stem seal assembly according to claim 1, wherein said first shell includes a discontinuity on its radially outer periphery, said discontinuity engaging and axially restraining said second shell.

8. A valve stem seal assembly according to claim 1, wherein said discontinuity includes a staked portion on its radially outer periphery, said staked portion engaging and axially restraining said second shell.

9. A valve stem seal assembly according to claim 1, wherein said discontinuity includes an upset portion on its radially outer periphery, said staked portion engaging and axially restraining said second shell.

10. A valve stem seal assembly for use in an internal combustion engine having a valve with a valve stem thereon, said valve stem assembly including:

a generally hollow first cylindrical shell having a radially inwardly extending flange adjacent an axially outer end of said shell and a radially outwardly extending flange adjacent an axially inward end of said shell;

a generally hollow second cylindrical shell having a radially outwardly extending seat adjacent an axially outer end thereof and a radially inwardly extending flange adjacent an axially inward end thereof, a portion of said first shell extending axially within an inner surface of said second shell, said second shell further including a generally axially-extending engagement portion adjacent said second shell axially inward end, said axially-extending engagement portion engaging a portion of an outer surface of said first shell in an interference fit therebetween; and

a resilient sealing body supported by said first shell, said resilient sealing body having an opening therethrough for receiving the valve stem in sealing contact therewith when said valve stem seal assembly is assembled into the engine.

11. A valve stem seal assembly according to claim 10, wherein said first rigid cylindrical shell is made of a metal-containing material.

12. A valve stem seal assembly according to claim 10, wherein said second rigid cylindrical shell is made of a metal-containing material.

13. A valve stem seal assembly according to claim 10, wherein said resilient sealing body is made of an elastomeric material.

14. A valve stem seal assembly according to claim 10, further including an annular sealing lip on a radially inner portion of said resilient sealing body.

15. A valve stem seal assembly according to claim 10, wherein said resilient seal body is fixedly interconnected with said first rigid cylindrical shell.

16. A valve stem seal assembly according to claim 10, wherein said first shell includes a discontinuity on its radially outer periphery, said discontinuity engaging and axially restraining said second shell.

17. A valve stem seal assembly according to claim 10, wherein said discontinuity includes a staked portion on its radially outer periphery, said staked portion engaging and axially restraining said second shell.

18. A valve stem seal assembly according to claim 10, wherein said discontinuity includes an upset portion on its radially outer periphery, said staked portion engaging and axially restraining said second shell.

19. A valve stem seal assembly for use in a valve-containing device having a valve with a valve stem thereon, said valve stem assembly including:

a generally hollow first cylindrical shell having a radially inwardly extending flange adjacent an axially outer end of said shell and a radially outwardly extending flange adjacent an axially inward end of said shell;

a generally hollow second cylindrical shell having a radially outwardly extending seat adjacent an axially outer end thereof and a generally axially-extending engagement portion adjacent an axially inward end thereof, a portion of said first shell extending axially within an inner surface of said second shell, said axially-extending engagement portion engaging a portion of an outer surface of said first shell in an interference fit therebetween; and

a resilient sealing body supported by said first shell, said resilient sealing body having an opening therethrough for receiving the valve stem in sealing contact therewith when said valve stem seal assembly is assembled into the valve-containing device.

20. A valve stem seal assembly according to claim 19, wherein said first rigid cylindrical shell is made of a metal-containing material.

21. A valve stem seal assembly according to claim 19, wherein said second rigid cylindrical shell is made of a metal-containing material.

22. A valve stem seal assembly according to claim 19, wherein said resilient sealing body is made of an elastomeric material.

23. A valve stem seal assembly according to claim 19, further including an annular sealing lip on a radially inner portion of said resilient sealing body.

24. A valve stem seal assembly according to claim 19, wherein said resilient seal body is fixedly interconnected with said first rigid cylindrical shell.

25. A valve stem seal assembly according to claim 19, wherein said first shell includes a discontinuity on its radially outer periphery, said discontinuity engaging and axially restraining said second shell.

26. A valve stem seal assembly according to claim 19, wherein said discontinuity includes a staked portion on its radially outer periphery, said staked portion engaging and axially restraining said second shell.

27. A valve stem seal assembly according to claim 19, wherein said discontinuity includes an upset portion on its radially outer periphery, said staked portion engaging and axially restraining said second shell.

28. A valve stem seal assembly for use in an internal combustion engine having a valve with a valve stem thereon, said valve stem assembly including:

a generally hollow first cylindrical shell having a radially inwardly extending flange adjacent an axially outer end of said shell and a radially outwardly extending flange adjacent an axially inward end of said shell;

a generally hollow second cylindrical shell having a radially outwardly extending seat adjacent an axially outer end thereof and a generally axially-extending engagement portion adjacent an axially inward end thereof, a portion of said first shell extending axially within an inner surface of said second shell, said axially-extending engagement portion engaging a portion of an outer surface of said first shell in an interference fit therebetween; and

a resilient sealing body supported by said first shell, said resilient sealing body having an opening therethrough for receiving the valve stem in sealing contact therewith when said valve stem seal assembly is assembled into the engine.

29. A valve stem seal assembly according to claim 28, wherein said first rigid cylindrical shell is made of a metal-containing material.

30. A valve stem seal assembly according to claim 28, wherein said second rigid cylindrical shell is made of a metal-containing material.

31. A valve stem seal assembly according to claim 28, wherein said resilient sealing body is made of an elastomeric material.

32. A valve stem seal assembly according to claim 28, further including an annular sealing lip on a radially inner portion of said resilient sealing body.

33. A valve stem seal assembly according to claim 28, wherein said resilient seal body is fixedly interconnected with said first rigid cylindrical shell.

34. A valve stem seal assembly according to claim 28, wherein said first shell includes a discontinuity on its radially outer periphery, said discontinuity engaging and axially restraining said second shell.

35. A valve stem seal assembly according to claim 28, wherein said discontinuity includes a staked portion on its radially outer periphery, said staked portion engaging and axially restraining said second shell.

36. A valve stem seal assembly according to claim 28, wherein said discontinuity includes an upset portion on its radially outer periphery, said staked portion engaging and axially restraining said second shell.